

Cropping Scheme

Definition

Cropping scheme is a farm budget prepared in advance of a cropping season of the year showing the details farm activities during the proposed year.

Importance or utility

1. It indicates the cost of seasonal and varietal cultivation.
2. For proper management of land, labour and capital.
3. It assist in proper functional planning.
4. It assists in calculation of actual net profit.
5. It assists the maintenance of proper farm functions.
6. It assists the preparation of the crop calendar in actual time.
7. It helps in calculating the cultivation and non-cultivation costs.
8. It illustrates the essential elements of a farm.
9. It illustrates the normal and abnormal condition of farm.
10. It allows calculations of the profit or loss of future crops.

Principles of preparation

- 1) Consultation should be made of a map, indicating the farm layout such as roads, ponds, irrigation facilities, number of plots and area etc.
- 2) Varieties of crop should be selected in accordance with local and national requirements.
- 3) Proper crop rotation should be followed for maintaining soil fertility and for controlling pest and disease.
- 4) Green manuring crop should be cultivated for organic matter.
- 5) A particular place should be earmarked for animal husbandry.
- 6) Irrigation and drainage facilities should be checked and made adequate for the cropping scheme.
- 7) Commercial crops should be considered.
- 8) Last years application of fertilizer and its residual effect should be considered.
- 9) A source of capital should be secured.

Multiple Cropping

Definition

Multiple Cropping may be defined as the growing of more than one crop in a year from the same piece of land.

Objectives

1. To increase the cropping intensity.
2. To increase land use intensity.
3. To obtain more crops from the same field in a year.
4. To maximize the use of land and time.
5. To increase the scope of land utilization and diversification of farming.
6. To increase cash income.
7. To cover the risk of low market prices and adverse climate on crops.

Advantage/Importance

- 1) It increases production per unit area.
- 2) It provides a wider variety of crops.
- 3) It increases the farmer's net income.
- 4) It increase the scope of land utilization and diversification of farming.
- 5) It allows better adjustment of planting time of crops.
- 6) It allows better utilization of labour.
- 7) It saves foreign currency expenditure.
- 8) It decreases the food deficit.

Disadvantage/Limitations

- 1) It hampers seed crops production.
- 2) It hampers intercultural operations.
- 3) It decreases nutrient status in soil.
- 4) It creates problem in adapting farm mechanization.

5) In some multiple cropping system inter specific competition occur.

Types of multiple Cropping

There are 4 major type of multiple cropping are given below-

1. Pure stand multiple Cropping: It is a multiple in which the crops are grown successively in a definite period of time of the year in the unit of land, possessed by farmers. In this Practice each crop sown and harvested separately with independent land preparation for each crops.

e.g. Aus paddy, lentil or soyabean or khesari.

2. Mixed type of multiple cropping: It is that kind of multiple cropping in which two or more crops are grown concurrently and mixed together in the same season and in the same piece of land.

E.g. Aus+B. amon, Mustard+lentil, Barley+Rai.

3. Inter-crop type of multiple cropping: In this kind of multiple cropping, the inter spaces of the rows of crops such as sugarcane, potato, maize, cotton etc are sown with other crops at the earlier stages of the main crops.

4. Relay type of multiple cropping: It is the inter planting of crops in the field prior to harvest the previous crops.

e.g. Sowing of seeds of khesari in the field of T. amon, sowing of seeds of water-melon in Rice field.¹

Crop Rotation

Definition

Crop rotation is a process of growing different crop in regular recurrent succession on a piece of land for specific period of time.

Planning/Principles of Crop rotation

1. Local demand for the crop is the prime consideration.
2. It should have flexibility to introduce alternate crops under adverse condition.
3. It should include a food crop for consumption by the farmers and a fodder crop for livestock.

¹ [For get advantage or disadvantage of these type of multiple cropping, see "Hand book of Agronomy" by Humayun kabir, page (211-213)].

[*"Career development in agriculture" book, 27 page for more type of multiple cropping*].

4. Smother or cover crop should be included in rotation to control soil.
5. Good rotation should include green manuring crops.
6. Good rotation should include leguminous crop.
7. Good rotation should include profitable cash crop.
8. Good rotation should include one tilled crop for eliminating weeds.
9. Good rotation should include heavily manured crop to increase nutrient status in soil.
10. Deep rooted crop should be followed by shallow rooted crops.
11. Adjustment of the crop should be made according to irrigation facilities.
12. During rotation the land should be kept fallow for one season.
13. Grain crops should be followed by leguminous crops.
14. The suitability of the crop should be taken into consideration.
15. The rotation and feeding system should provide for keeping up the organic matter of the soil.

Crop Diversification

Definition

Crop diversification may be defined as the growing of different crops in a farm or region, either in succession or simultaneously or both together in the course of a year.

Advantage or Importance

1. Biotic environmental balance is maintained to avoid biotic pressure.
2. Judicious crop rotation system are ensured for Agro-ecological Zone.
3. Avoid unbalanced in the biosphere.
4. It helps to malnutrition by supplying balanced diet to the common people.
5. It improves the soil fertility and productivity of the crop.
6. Risk of growing one crop can be overcome.
7. Market demand can be fulfilled.
8. It helps to increase or safe Biodiversity.

9. It helps to control pest and disease.
10. It increases the scope of income.
11. It decrease the risk of crop loss.
12. It helps to achieve self-sufficiency in food grain.
13. It helps to increase cropping intensity.
14. It ensure to develop the agro based industry.
15. It develops the Status of the farmer and national economy.
16. Economy of labour can be maintained.
17. It ensures maximum utilization of time and space.
18. It help to reduce the dependency on other countries.

Present Status of Crop Diversification in Bangladesh

Crop diversification is an old traditional practice in Bangladesh but currently due to introduction of different irrigation facilities to deep tube well, shallow, power pump etc. This traditional crop production practiced have been changed. As a result, the area of rice crop has increased at the cost of diversified crops such as pulses, Oil seeds and other crops. Some present situation regarding crop diversification in Bangladesh are mentioned below-

1. Statistical Information: There is no scope to know the actual position of crop diversification in Bangladesh because the farmers does not keep information about it. Besides this, the government of Bangladesh does not take any conducive step to collect. Such type information only the Bangladesh Buero of Statistics (BBS) collect some relevant information.

In Bangladesh, there are 33.1 lake hectare of double cropped area and 6.6 lake hectare of triple cropped area. (BBS 1980 & BBS 1989).

2. Steps taking by the government: For entire development of the country the government take Crop Diversification Program (CDP). The Ministry of Agriculture (MoA), Canadian International Development Agency (CIDA) and Director General of International Service (DGIS) are involved for establishing this program 4 organization under the MoA e.g.

- Bangladesh Agricultural Research Institute (BARI).
- Bangladesh Agricultural Development Corporation (BADC).
- Department of Agricultural Extension (DAE).
- Department of Agricultural Marketing (DAM).

This organization has played a great role for establishing this project.

3. Crop Identification under Program: Main crop are mustard, lentil, groundnut, gram, sunflower, khesari, mung, potato, sweet potato, soyabean, maize also involved this project. USAID and UNDP help in his project.

4. Transfer Program: All improve technologies are not acceptable to the farmers. It's acceptability depends on new crop, cultivation in farmers farming system, time by utilization of technology and profitability and sustainability of the technology. Technologies in farming system extension under crop diversification are mentioned below-

- Cropping pattern.
- Mixed cropping.
- Relay cropping.
- Zero/minimum tillage.
- Fertilizer demonstration.
- Home gardening.
- Apiculture.
- Block demonstration.
- Compost preparation.
- Social forestry.
- School gardening.
- Seed exchange program.
- Agro technology & family education extension program.
- Farms and equipment demonstration.
- Integrated pest management.
- TPS/Potato production technology.

Future Strategy of Crop diversification

1. Kharif season- The maize based or cotton based crop production.
2. Robi season- The jute based on wheat based crop production.
3. Sugarcane land can be brought under inter-cropping totally.
4. As a relay crop khesari/ lentil/ grasspea is included in T. amon field.
5. Short duration and leafy vegetables such as red amaranth, batishak, chinshak etc grown.
6. Different varieties of vegetable crop should be grown in banana, papaya field as inter crop.
7. The high land area requiring vegetable crop, e.g. cauliflower, cabbage, tomato etc.
8. Introduce HYV of different crops among farmers for increasing yield per unit of land.
9. Developed HYV through research.
10. Introduce expensive extension among farmers to develop their situation.
11. Develop suitable technology - Integrated pest management, organic farming etc.

12. Increasing profitable production of minor crops (e.g. pulse) along with major crops.
13. Improvement of suitable technologies on dry, wet and rainfed areas.
14. Improvement of soil fertility through proper soil management.
15. Formulation of Integrated land use policy.
16. Development and dissemination of appropriate transport, storage, marketing etc facilities.

As present there is 84.4 lakh hectare of land is under cultivation and total cropped land about 128.4 lakh hectare, i.e. 93% of total land.

So, we should grow minimum 3 crops in a year in all high land and medium high land and 2 crops in a year in medium low land. There by, we will get a glorious future by accepting the inter crop technology.

Crop Intensification

Definition

Crop intensification may be defined as growing of crop with intensive care and management by utilizing modern variety and technology to maximize production in a area of land.

Objectives

1. To increase the national income.
2. Maximum use of land.
3. To decrease the insect, pest and disease.
4. To increase the soil fertility and productivity.
5. To increase the employment opportunity.
6. To recover the crop loss for different dormant condition.
7. To increase mixed or inter crop production.
8. To maximum utilization of solar radiation.
9. To increase intensification index by multiple cropping.
10. To ensure food security.

Advantage/Importance

- 1) It increases yield per unit area.
- 2) It increase the national income.
- 3) It helps to Maximum use of land.
- 4) It decrease the insect, pest and disease.
- 5) It increase the soil fertility and productivity.
- 6) It increase the employment opportunity.
- 7) It To recover the crop loss for different dormant condition.
- 8) It ensure food security.
- 9) Helps to reduce starvation.
- 10) It helps the emissions of methane from Biomass, cowdung, urine etc.

Disadvantage /Limitations

- 1) Intensive farming hampers environment in many ways.
- 2) Crop Intensification limits or destroy the natural habitat.
- 3) Use of fertilizer in the crop field sometimes harmful for intensified animals.
- 4) Pesticides have to change the crop by destroying both harmful and useful insect.
- 5) It requires large amount of energy, input and transport.
- 6) Use of chemicals- sometimes harmful both crops and animals.

Cropping Pattern

Definition

Cropping pattern may be defined as growing of crops on a land in sequence in a year.

Major cropping pattern in Bangladesh

1. Fallow - T. amon - Boro rice (Irrigated).
2. Aus rice - T. amon - fallow (Rainfed).
3. Aus rice - T. amon - wheat (Rainfed).

4. Jute - T. amon - lentil (Rainfed).
5. Fallow - Mustard - Boro rice (Irrigated).
6. Fallow - Fallow - Boro rice (Irrigated).
7. Vegetable - jute - T. amon.
8. Potato - T. aus - T. amon.
9. Sugarcane -----
10. Banana -----

Possibilities for Improvement The Cultivation Pattern in Bangladesh

There are several possibilities for improving existing cropping patterns in Bangladesh, as it is one of the most suitable areas in the world.

1. It may not be easily possible to bring about profitable change in the cropping pattern during the Kharif season in which the important crops e.g. rice, wheat, sugarcane etc are grown in large areas. But in rabi season which produce crops only 9% of total cropped area has great potential for changing existing cropping patterns.
2. If Irrigated facilities along with financial help, technical knowledge etc are provided to cultivated areas under rabi crops. it will be possible to produce crops economically on a large scale and the cropping pattern will be changed.
3. With increased availability of irrigation facilities, supply of good seeds and fertilizer and plant protection materials and other agricultural implements, the existing cropping pattern can be changed greatly, particularly in rabi season.
4. Full scale implementation of GK project, Tista Barage project, Deep tube well project should supply sufficient irrigation water, and BADC may help the cultivators by timely supplying good seeds, fertilizer, plant protection materials and other physical facilities, so allowing full implements of the plan to expand crop production in the rabi season.
5. In changing crop pattern, Bangladesh Krishi Bank and co-operative bank may gives loan to the farmers.
6. For changing, cropping pattern judicious selection of the crop should be made.
7. Through studies, the accommodation of more sets of crops for triple cropping could be developed, which would changed existing cropping pattern.

Cropping Calendar

Definition

Crop calendar is the schedule of cultural operation needed in crop production with respect to time.

Objectives

The main objective of a crop calendar is know in advance the timing of cultural Practices of different crops. other objectives are given below-

1. To know actual time of sowing and harvesting of different crops.
2. To facilities for managing money.
3. To assist in proper distribution of labour.
4. To assist in efficient management of crops.
5. To know the actual time for applying fertilizer and pesticides.
6. To record the results of different agricultural practices.

Utility

1. A crop calendar indicates the period /time at which the production Practices of each crop have to be done.
2. It systematized forming and help in efficient farm management.
3. It help the bankers in the distribution of loans to the farmer and realization of the loans from the farmers.

Procedure of Preparation

1. To prepare a crop calendar the production Practices needed for crops are enlisted with respect to time, usually in tabular form under some main heads. e.g. land preparation, sowing/planting time, intercultural operation, harvesting, post harvest operation etc.
2. Convenient of using of time is usually taken as a month.
3. As become time of a particular operations may prolong for different month, it has to be indicated in crop calendar accordingly.

Types of Crop calendar

1. *Tabular crop calendar.*

- a. Descriptive

b. Month wise

- Land preparation
- Sowing/transplanting
- Cultural Operation
- Harvesting
- Post harvest operation

2. ***Graphical Crop calendar.***

a. Horizontal

b. vertical

c. Circular

3. ***pictorial crop calendar***

Crop Reporting

Definition

Crop reporting is the description of the crop in growing stage, mentioning the present condition involving yield status and pest management with comments for improvement.

Objectives

1. To evaluate crop production.
2. To achieve crop forecasting.
3. To compile information with different statistical data.
4. To alleviate the loss from the attack of pests and disease.
5. To determine total production.
6. To facilitate decision making for cropping pattern.

Procedure of Crop Reporting

1. The nature of crops should be recorded with the varieties.
2. The total area of the cropping land should be recorded.
3. The age and development of crops should be recorded.

4. Crop condition such as vigour, growth and infection by pests or disease should be recorded.
5. Future outline of crop pattern should be formulated etc.

Crop Forecasting

Definition

By crop forecasting we mean estimate or predicting the yield of certain crop during its growth period and sufficiently ahead of the time of its harvest.

Objectives

1. To help the government of fix the price of different commodities.
2. To know the actual situation of crop production.
3. To make a future plan.
4. To help the farmer/government to store appropriate quantities of produce.
5. To decided whether food will imported or exported of assessing of the crop.

Advantage / Importance

1. It helps to the government to decide whether food will be exported or imported on assessing the condition of the crop.
2. It helps the government to fix the price of different agricultural commodities.
3. It helps the government to store appropriate quantities of produce.
4. It helps the government to take necessary action, if damage to crops is caused by natural calamities.

Crop Yield Estimation

Yield

The total dry matter produced by a crop is known as biological yield and a fraction of the biological yield which is useful for human is known as economic yield.

Yield Estimation of Field Crops

Yield estimation of various crops have been attempt with the use of yield components. Yield

cost of Rice crop are as follows-

01. RICE

What would be the yield of rice grains, if the average panicle density/m²- 260, No. of field grains/panicle- 136, Test weight- 20g. Estimate the yield of rice?

Solution

Yield of rice (ton/ha) = $(10,000 \times \text{No. of panicle/m}^2 \times \text{No. of grains/panicle} \times \text{Test weight}) \div (1000 \times 1000 \times 100 \times 10)$.

= $(10,000 \times 260 \times 136 \times 20) \div (1000 \times 1000 \times 100 \times 10)$.

= 7.072 ton/ha.

02. WHEAT

Yield Estimation of wheat grain and straw from following information-

- Spacing- 20cm X 3cm.
- No. of effective tillers/plant.
- No. of grains/panicle- 32.
- Test weight- 40 g.
- grain:straw- 1:1.5

Solution

Spacing = $20 \times 3 \text{ cm}^2 = 0.2 \times 0.03 \text{ m}^2 = 0.006 \text{ m}^2$

0.006 m² place have 1 till

= 1 m² place have $(1 \div 0.006)$ till = 500 tills.

Yield of wheat grain = $(10,000 \times \text{No. Effective tills/m}^2 \times \text{No. of grains/panicle} \times \text{test weight}) \div (1000 \times 1000 \times 100 \times 10)$.

= $(10,000 \times 500 \times 32 \times 40) \div (1000 \times 1000 \times 100 \times 10)$.

= 6.4 ton/ha.

Yield of wheat straw = $(6.4 \times 1.5) = 9.6 \text{ ton/ha}$. [given that- grain: straw = 1:1.5].

03. MAIZE

Yield Estimation of maize from following information-

- Spacing- 75cm X 30cm = 0.75 X 0.3 m²=0.225 m².
- No. of cobs-2.
- No. of grains row/cob-10.
- No. of seeds/grain row- 25.
- Test weight- 200 g.

Solution

Yield of maize=(10,000 X cobs/plant X grains row/cob X No. of seeds/grain row X test weight)÷(1000 X 1000 X 100 X 10 X spacing/m²).

$$= (10,000 \times 2 \times 10 \times 25 \times 200 \text{ g}) \div (1000 \times 1000 \times 100 \times 10 \times 0.225).$$

$$= 4.44 \text{ ton/ha.}$$

04. SUGARCANE

Yield Estimation of sugarcane from following information-

- No. of millable cane/clump- 15.
- spacing of clump- 90 X 60 cm²= 0.54 m².
- Weight of cane- 600 g.

Solution

Yield of Sugarcane= (10,000 X No. of millabl cane/clump X Weight of cane)÷(spacing/m² X 1000 X 100 X 10)

$$= (10,000 \times 600 \times 15) \div (0.54 \text{ m}^2 \times 1000 \times 100 \times 10).$$

$$= 166.66 \text{ ton/ha.}$$

05. JUTE FIBRE

Yield Estimation of Jute fibre from following information-

- spacing of clump- $25 \times 10 \text{ cm}^2 = 0.025 \text{ m}^2$.
- Weight of matured plant- 65 g.
- Extractable fibre/percent- 7.5%.

Solution

Yield of Jute fibre = $(10,000 \times \text{Weight of matured plant} \times \text{Extractable fibre/percent}) \div (\text{spacing} \times 1000 \times 100 \times 10)$.

= $(10,000 \times 7.5 \times 65) \div (0.025 \times 1000 \times 100 \times 100)$.

= 19.5 Quintal/ha.

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[If any wrong has been seen in calculation, please Correction it]

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